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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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09/745,047	12/20/2000	Robert M. Geffken	BUR9-2000-0063-US1	7966
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5409 7590 06/05/2002

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EXAMINER

SOWARD, IDA M

ART UNIT	PAPER NUMBER
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2822

DATE MAILED: 06/05/2002

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/745,047

Applicant(s)

GEFFKEN ET AL.

Examiner

Ida M Soward

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 26 April 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-28 is/are pending in the application.
- 4a) Of the above claim(s) 15-28 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☐ Claim(s) 1-14 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 12-20-00 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2. 6) ☐ Other: _____

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0DETAILED ACTION

This office action is in response to the election filed on April 26, 2002.

Election/Restrictions

Applicant's election with traverse of application serial number 09/745,047 in Paper No. 4 is acknowledged. The traversal is on the ground(s) that the search and examination of the entire application can be made without serious burden. This is not found persuasive because the Group I and Group II inventions requires a search in two separate classifications in which Examiners are familiar with one or the other. Therefore, the examination of the entire application could not be made without serious burden.

The requirement is still deemed proper and is therefore made FINAL.

Drawings

Figures 1-3E should be designated by a legend such as --**Prior Art**-- because only that which is old is illustrated. See MPEP § 608.02(g). A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-7 and 9-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Prior Art Figures 1-3E in view of Farooq et al. (5,705,857).

Prior Art Figures 1-13E teach an electronic structure **10**, comprising: a substrate layer **12** that includes a first electronic device **20**; a first insulative layer **48** on the substrate layer; a first damascene conductive wire/stud **61** having a lower portion in the first insulative layer and an upper portion above the first insulative layer; a second insulative layer **7** on the first insulative layer; a damascene conductive wiring line structure **8** within the second insulative layer; the lower portion of the first damascene conductive wire/stud is conductively coupled to a first portion **23** of the first electronic device; a second damascene conductive wire/stud **62** having a lower portion in the first insulative layer and an upper portion above the first insulative layer, wherein the lower portion of the second damascene conductive wire/stud is conductively coupled to a second portion **22** of the first electronic device; the first electronic device being a MOS field effect transistor (FET), wherein the first portion of the first electronic device includes a gate of the FET, and wherein the second portion of the first electronic device is selected from the group consisting of a source of the FET and a drain of the FET; the substrate layer further comprising a second electronic device **30**, and wherein the

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electronic structure further comprising: a second damascene conductive wire/stud having a lower portion in the first insulative layer and an upper portion above the first insulative layer, wherein the lower portion of the second damascene conductive wire/stud is conductively coupled to the second electronic device; and a damascene conductive wiring line **67** within the second insulative layer, wherein the damascene conductive wiring line is above the second damascene conductive wire/stud and is insulatively isolated from the second damascene conductive wire/stud; a shallow trench isolation (STI); and an internal seam or void oriented lengthwise within the first damascene conductive wire/stud. However, Prior Art Figures 1-3E fail to teach a metallic cap. Farooq et al. teach a metallic caps **23** (having a preferred thickness of about 0.100 to 1.000 microns) of an electrically conductive material selected from the group consisting of aluminum, chromium, cobalt, gold, nickel, palladium, platinum, silver, to name a few that is in contact with the upper portion of a conductive wire and is different from the conductive copper stud **18**; a dual damascene **28** within a second insulative layer **30** (which covers metallic cap **23**) such that a dual damascene **128** is above the second metallic cap **23** and is conductively coupled to the second metallic cap; and a conductive wiring line structure **131** is above and in contact with metallic cap **23** (Figures 4-5, cols. 4-5, lines 9-67 and 1-36, respectively). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the structure of Prior Art Figures 1-3E with the metallic cap of Farooq et al. to reduce process variability.

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Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Prior Art Figures 1-3E and Farooq et al. (5,705,857) as applied to claim 1 above, and further in view of Cheek et al. (6,018,180).

Prior Art Figures 1-3E and Farooq et al. teach all mentioned in the rejection above. However, Prior Art Figures 1-3E and Farooq et al. fail to teach a lower portion of a conductive stud is on the STI. Cheek et al. teach a lower portion of a conductive stud **470** is on the STI **220** (Figure 12, col. 8, lines 9-43). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the structure of Prior Art Figures 1-3E and the metallic cap of Farooq et al. with the STI of Cheek et al. to obtain a higher yield.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

The following patents are cited to further show the state of the art with respects to damascene conductive studs and wires:

Sullivan (US6,333,557 B1)

Sullivan (US 6,180,506 B1).

The following patents are cited to further show the state of the art with respects to metallic cap layers:

Furukawa et al. (US 6,333,229)

Joshi et al. (US 6,323,554 B1)

Zawaideh (5,877,557).

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ida M Soward whose telephone number is 703-305-3308. The examiner can normally be reached on Monday - Friday, 7:30 am to 4:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead, Jr. can be reached on 703-308-4940. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

ims
June 1, 2002


CARL WHITEHEAD, JR.
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800